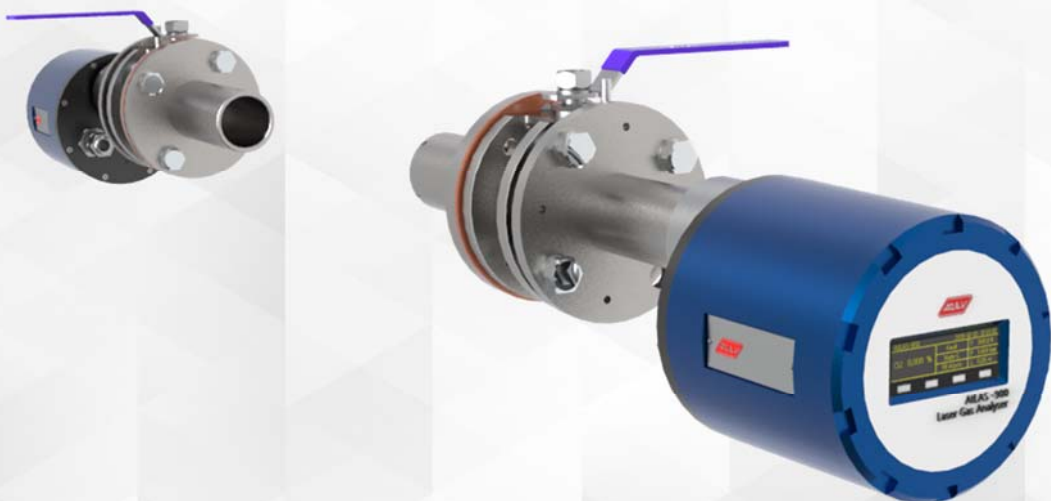




# Laser Analyser AtLAS-900

Analyser based on laser (TDLAS) technology for in situ applications in safe area and in hazardous area, ATEX classified (Zone 1 / 21).



# AtLAS-900

[www.adev.it](http://www.adev.it)

## In Situ Type Process Analyser based on single ray Laser Technology (TDLAS)

AtLAS-900 is a laser gas analyser for industrial on line monitoring, able to measure in-situ a great number of gas including O<sub>2</sub>, CO, CO<sub>2</sub>, H<sub>2</sub>O, H<sub>2</sub>S, HCl, HF, HCN, NH<sub>3</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>.

The TDLAS technology provide an incredibly fast response time, small drift and measure virtually free from interferences of other gases.

Optimized for heavy industrial applications, AtLAS-900 features a very robust design and it comes with all the needed accessories for an easy installation and periodical calibration.

The extremely simplified and resilient design allows to reduce to the minimum the maintenance operations on the analyser.

The AtLAS-900 can be provided for safe area or for hazardous area classified Zone 1 / Zone 21 (ATEX certified).

## TDLAS Analyser

for in-situ cross stack  
applications



# Technical Specification

## TDLAS Analyser AtLAS-900

### Performance Specification

Optical Channel Length	0.3...20 meters [note 1]
Accuracy	≤ ±1% FS
Linearity Error	≤ ±1% FS
Repeatability	≤ ±1% FS
Zero & Span Drift	≤ ±1% FS / 6 months
Maintenance Cycle	≤ 2 times / year (clean optical window)
Calibration Cycle	≤ 2 times / year
Enclosure Rating	IP66
Response Time	≤ 1 sec. at T90

### Signals

Analog Output	2 x 4-20 mA isolated (max. load 750 Ω)
Analog Input	2 x 4-20 mA isolated [note 2]
Digital Output	RS485 / RS232
Relay Output	3 x (24V, 1A)

### Operative Specification

Sample Temperature	0°C...1300°C [note 3]
Pressure	Max. 3 bar abs.
Dust Content	≤ 1 g/m <sup>3</sup> or ≤ 30 g/m <sup>3</sup>
Water Vapor Content	Whichever, non-condensing
Installation	In situ (cross-stack)
Process Connection	By soldering or with flange DN40 PN 1.6 MPa
Route Valve Flange	DN50 PN 1.6 MPa (standard valve) DN65 PN 1.6 MPa (gate valve for T > 300°C)
Power Supply	24 Vdc or 100...240 Vac, ≤ 20W
Ambient Temperature	-20°C...+60°C
Ambient Humidity	≤ 90% non-condensing
Purge Gas	Nitrogen or purified instrument air [note 4] Pressure range: 0.3 MPa...0.8 MPa Flow rate: 0...4300 l/h [note 5] Purging gas ports: Ø 8 mm
Wiring Connections	ATEX version: 1 x armored cable gland for cable 6.5÷10.5 mm. Safe area version: 2 x cable glands for cable 5÷8 mm 3 x threaded hole M20 x 1.5 (with plug) 1 x threaded hole M25 x 1.5 (with plug)

### Physical Specification

Materials Contacting Sample	Optical Windows: K9/JGS2 Quartz Instrument host: 6061 / SS 304 Flange/tube assembly: SS 316L Root valve: SS 304
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### Purge Gas Table

Gas	Temperature	Purge Gas
O <sub>2</sub>	< 400°C	N <sub>2</sub>
O <sub>2</sub>	400...1300°C	Air / N <sub>2</sub>
CO	≤ 1300°C	Air / N <sub>2</sub>
CO <sub>2</sub>	≤ 1300°C	Air / N <sub>2</sub>
H <sub>2</sub> O	≤ 1300°C	Air / N <sub>2</sub>
H <sub>2</sub> S	≤ 1300°C	Air / N <sub>2</sub>
HCl	≤ 1300°C	Air / N <sub>2</sub>
HCN	≤ 1300°C	Air / N <sub>2</sub>
HF	≤ 1300°C	Air / N <sub>2</sub>
NH <sub>3</sub>	≤ 1300°C	Air / N <sub>2</sub>
CH <sub>4</sub>	≤ 1300°C	Air / N <sub>2</sub>
C <sub>2</sub> H <sub>2</sub>	≤ 1300°C	Air / N <sub>2</sub>
C <sub>2</sub> H <sub>4</sub>	≤ 1300°C	Air / N <sub>2</sub>
CO + CO <sub>2</sub>	≤ 1300°C	Air / N <sub>2</sub>
NH <sub>3</sub> + H <sub>2</sub> O	≤ 1300°C	Air / N <sub>2</sub>
HCl + H <sub>2</sub> O	≤ 1300°C	Air / N <sub>2</sub>
HF + H <sub>2</sub> O	≤ 1300°C	Air / N <sub>2</sub>

### Notes

#### [Note 1]

Minimum optical path depends on gas to be measured and range. Contact ADEV

#### [Note 2]

For eventual live compensations of temperature, pressure and O<sub>2</sub> impurities inside purging Nitrogen, if used.

#### [Note 3]

For process temperature > 500°C water cooling system is required. Contact ADEV.

#### [Note 4]

Instrument air cannot be used as purging gas in case the gas to be measured is O<sub>2</sub> and process gas temperature is < 400°C

#### [Note 5]

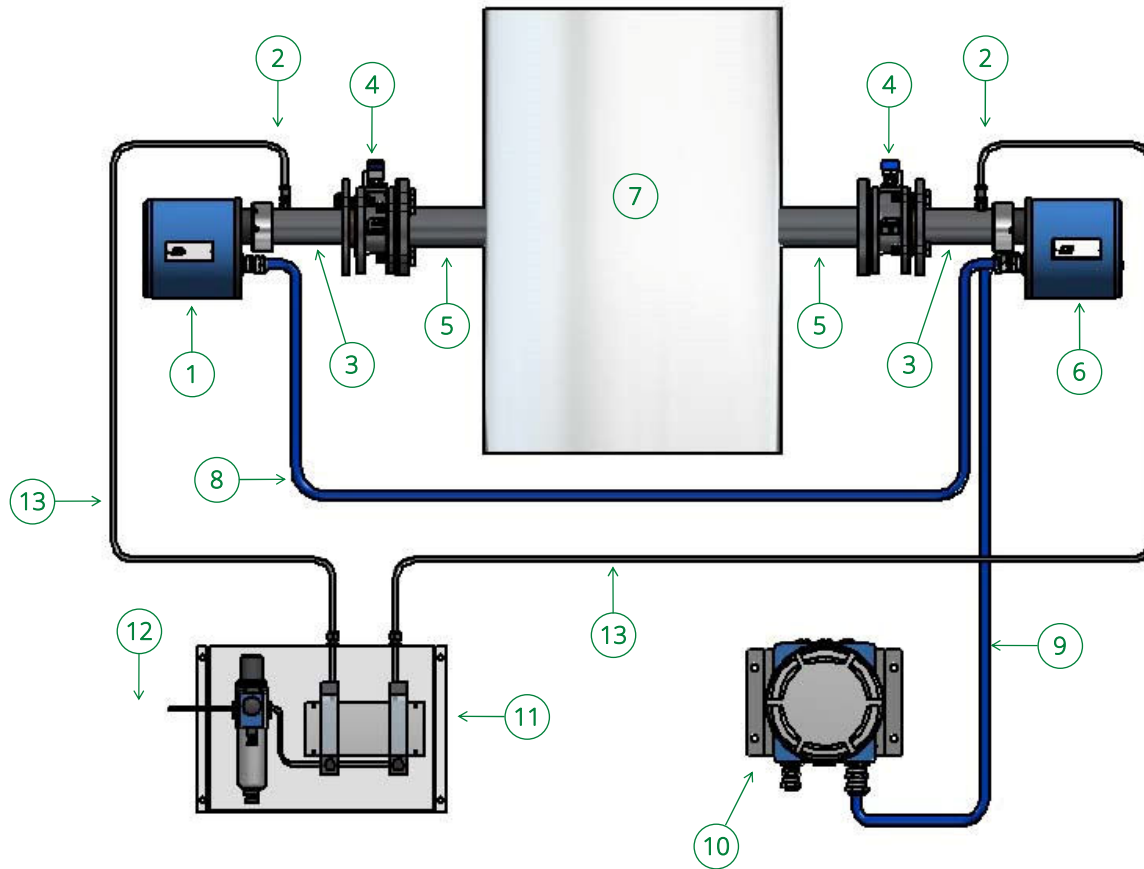
The precise flow rate of purging gas cannot be predetermined. It depends on several factors just like pressure and flow rate of sample gas, dust amount and type.

Minimum suggested:

- for pants working in positive pressure: 500 l/h
- for pants working in positive pressure: 350 l/h

# Complete System Layout

TDLAS Analyser AtLAS-900



#	Description	Weight
(1)	Transmitter Unit	10,5 Kg
(2)	Purge Gas Inlet	/
(3)	Instrument Flanged Tube	} 12,8 Kg.
(4)	Root valve	
(5)	Insertion Flanged Tube	
(6)	Receiver Unit	10,5 Kg
(7)	Process Gas Pipeline or Stack	/
(8)	Transmitter to Receiver Cable	/
(9)	Receiver to Junction Box Cable	/
(10)	Junction box	7,5 Kg
(11)	Cabinet with Purging System	8,4 Kg.
(12)	Air / N2 inlet (fitting for Ø8 mm tube)	/
(13)	Ø8 mm Tube for Purge Gas	/

Example of Field Installation



# Transmitter



## Description

Transmitter unit connects to process pipeline through connecting flange. It contains of diode laser, collimating optical system, driver board and temperature control circuit board.

In cleaning and maintenance, the root valve of connection flange has the function of isolating process pipeline and operating environment and preventing dangerous gas leakage.

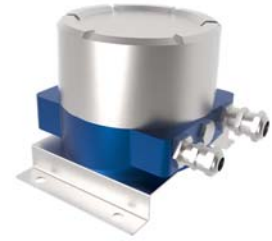
# Receiver



## Description

Receiver unit connects to process pipeline through connecting flange. It contains of photoelectric sensor, lens, receiving mainboard, sensor board and display board. Lens focus laser on the photoelectric sensor, then translate the optical signal into electrical signal. After obtaining second harmonic signal, translate the signal into concentration, and display the gas concentration on OLED.

# Junction Box



## Description

Junction box contains of output signal interface, which make it easy for user to connect to external power supply line, 4-20mA output line, relay line and serial interface.

## Key Applications

- Combustion control & Emissions
- Slip Ammonia control in deNOx plants
- Process and Safety Monitoring
- Inerting Control
- Solvents & Sulfur Recovery
- Chemical and Petrochemical Industry
- Steel Industry
- Blast furnace gas and Coke oven gas
- Coal injection safety control
- Power Plants
- SCR NH3 injection
- FCC catalyst regeneration
- Electric tar precipitator (ETP) safety control
- Flue gas measurement outlet of process heaters, fractionators, thermal crackers, utility boilers & incinerators

## European Compliance

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- ATEX Directive 2014/34/EU



## ATEX

ATEX certification for Zone 1 / Zone 21 with protection mode:



II 2 G D

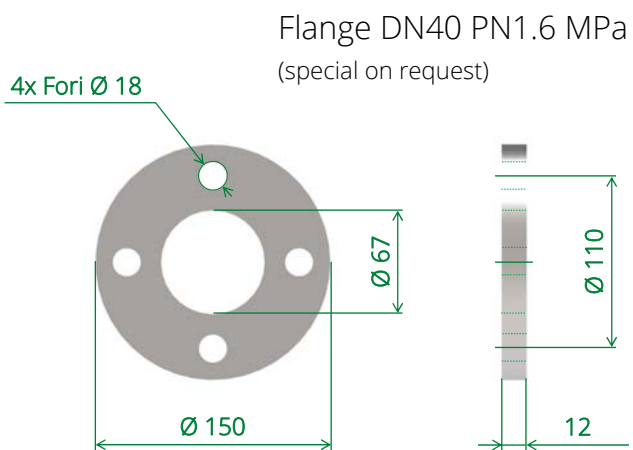
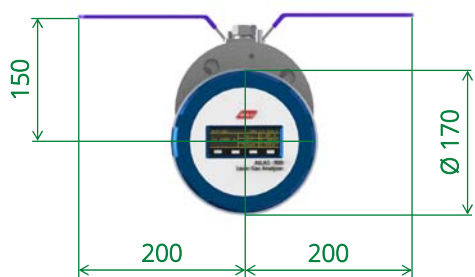
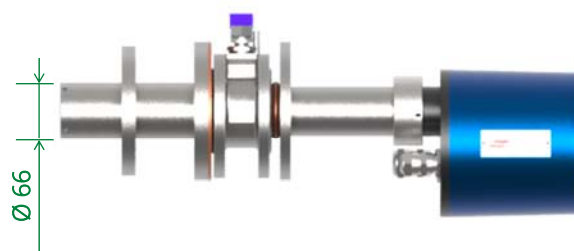
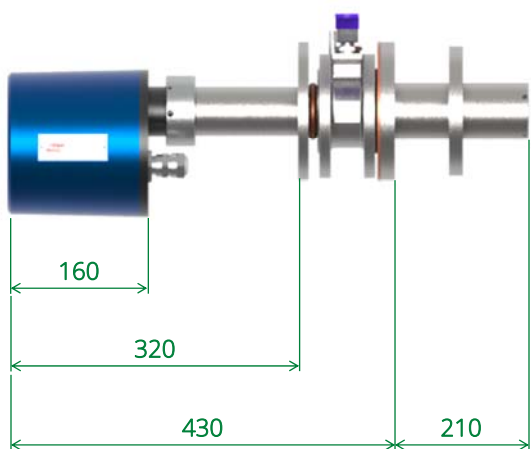
Ex db op is IIC T6 Gb Ex  
Ex tb op is IIIC T80°C Db

Ta = -20°C to +60°C

ATEX Certificate Number **CML 18 ATEX 1400X**

# Dimensional Layout

## Type [1] - Flange Mounting



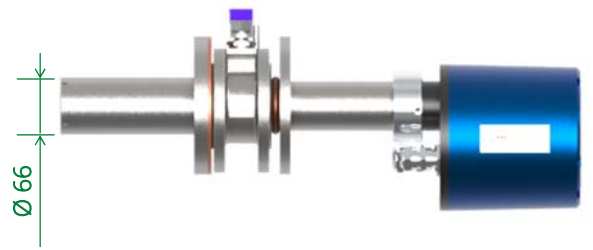
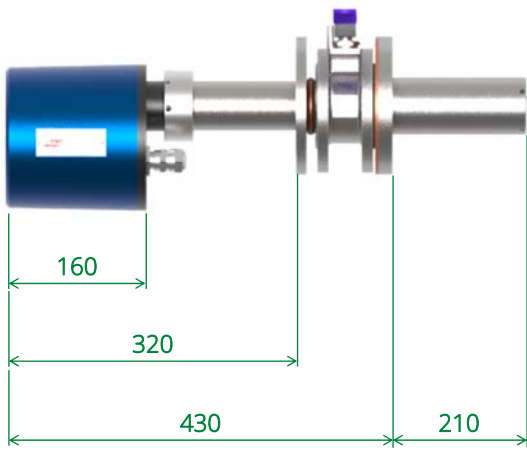
## Type [2] - Flange Mounting & Protection Tube



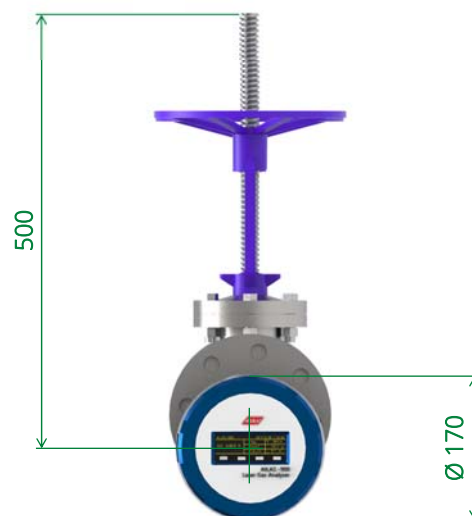
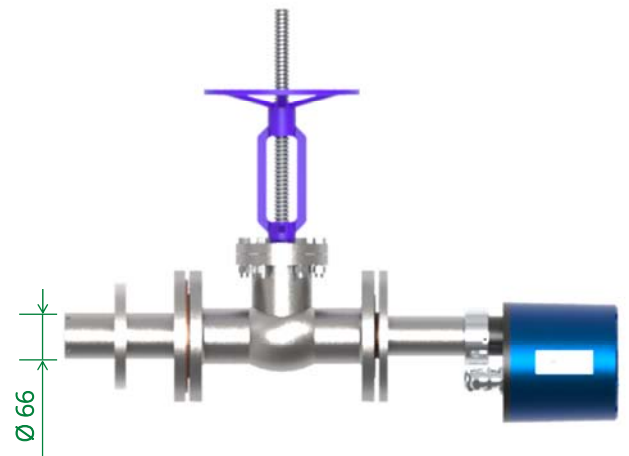
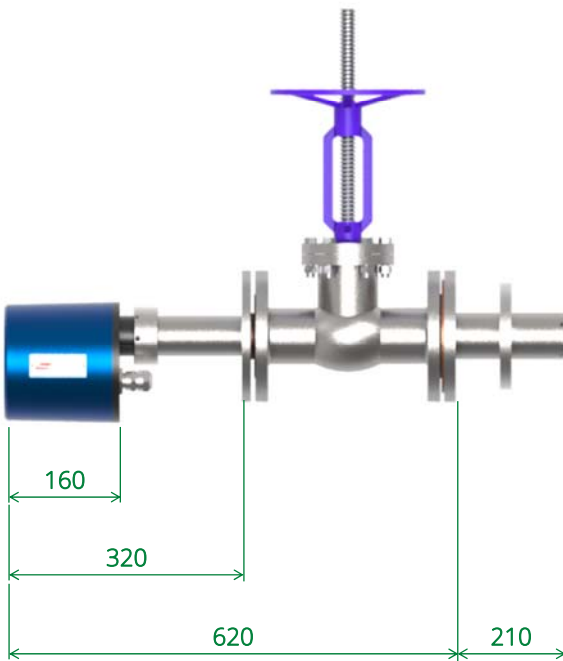
Quotes expressed in mm

# Dimensional Layout

## Type [3] - By Soldering



## Type [4] - With Gate Valve

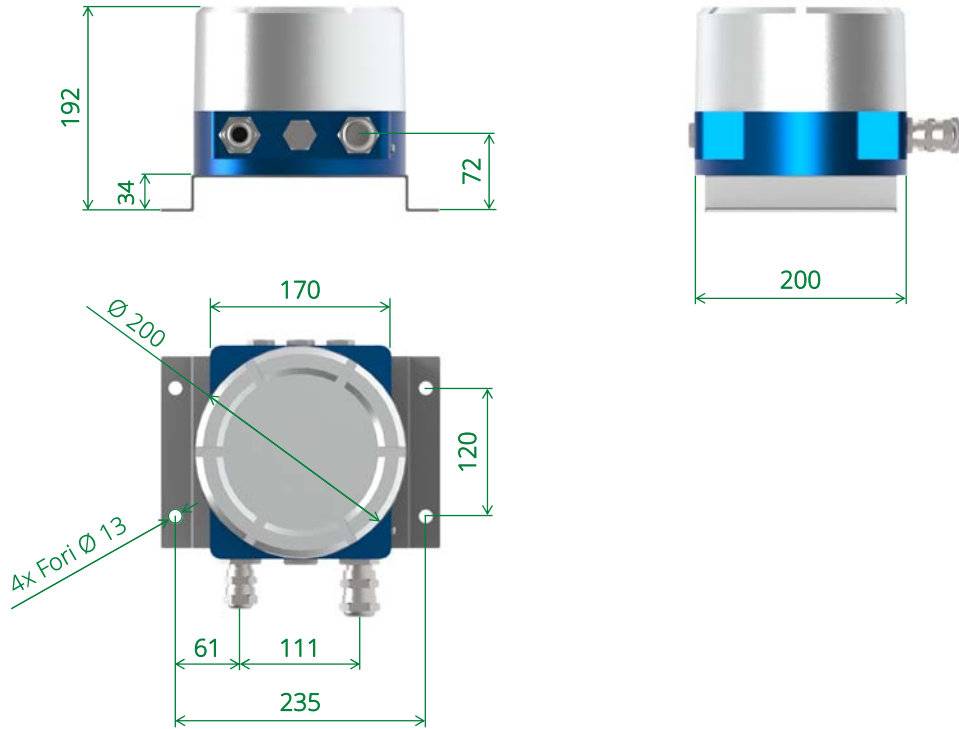


Quotes expressed in mm

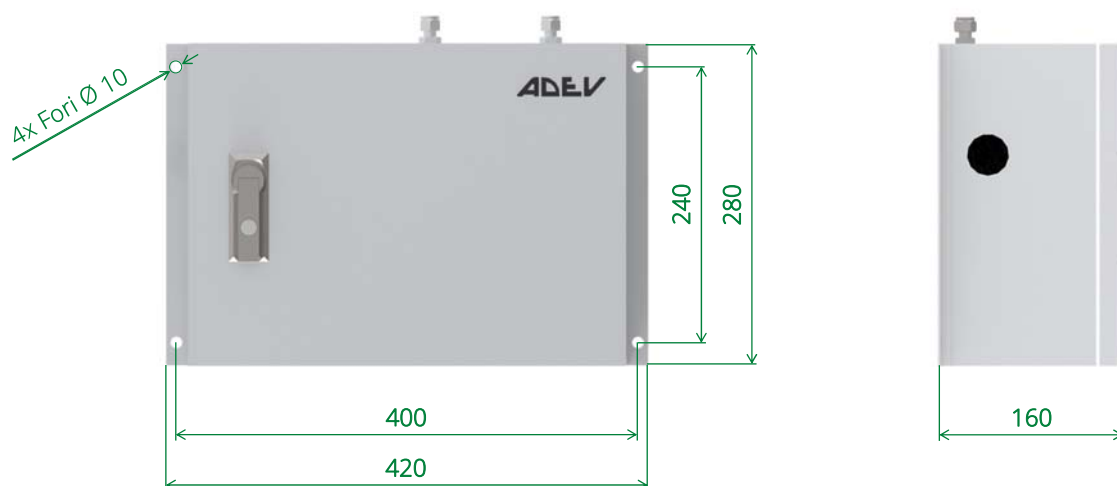


# Dimensional Layout

## Junction Box



## Purging Cabinet



Quotes expressed in mm



# AtLAS-900 Accessories

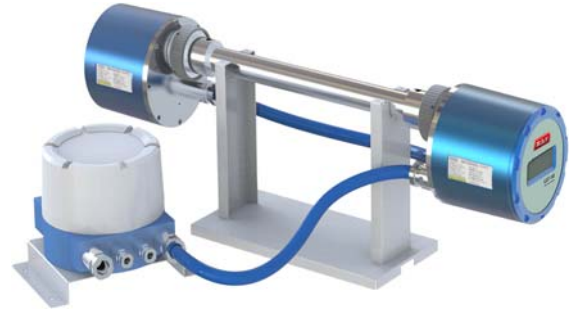
## Included Accessories

Every single analyser is delivered complete with all necessary accessories: calibration cell kit, purge cabinet, insertion tubes, insertion flanged tube and instrument flanged tube, root valves, mounting tools and interconnection cables.

### Calibration Kit

Calibration kit is provided together with the analyser in order to perform an off line calibration. It consists on:

- One SS316 tube with IN / OUT to connect gas from certified cylinder for calibration (standard gas path 500 mm; special requirements can be customized)
- One zinc-plated support where to fix the calibration tube for a comfortable operation.
- One flow meter with 0-2 l/min. scale
- One plastic hose with 1,5 meters length



### Purge Unit

In order to assure that the product can run continuously for a long time, purge with a gaseous media should be applied on windows, which also avoid the influence of dust in measurement and other pollutants on optical window.

The purging cabinet has inside one pressure reducer/stabilizer on purge gas inlet and two flowmeters to adjust the proper flow rate to the transmitter and receiver units.

The supply also includes 30 meters of 8 mm tube in SS304 to connect the cabinet to the instrument.

### Installation & Commissioning Kit

2x magnetic pens ; 1 x wrench for clamping transmitter and receiver on the flanged tubes; 1x O-ring for alignment system; 2x O-ring for tightening transmitter and receiver on the flanged tubes; 8x screws/nuts/washers for purging cabinet wall mounting; 2x check valves; 2x straight tube-tube 8 mm fittings for purging system; 1x fitting 1/2" for 8 mm tube.

## Optional Accessories

### Protection Tube

In consists in a SS316 tube that connect transmitter and receiver unit, extending inside the stack.

Necessary for high-vibrating applications, high dust applications and when there is risk of water condensation inside the stack or pipeline.



### Laser Emitter and Target

This alignment kit is composed by e Laser emitter and one Target that, screwed on the two extremities of the flanged mounting tubes, allow to check the perfect alignment (and eventually correct it) between transmitter and receiver during the installation. Battery charger Included.

### Flange

DN40 PN1.6 MPa flange (standard), soldered on the insertion tube of the analyser to perform a flanged-mounting type, in alternative to soldering type. Flange type can be customized (on request) to match already existing mounting configurations.



# TDLAS Technology

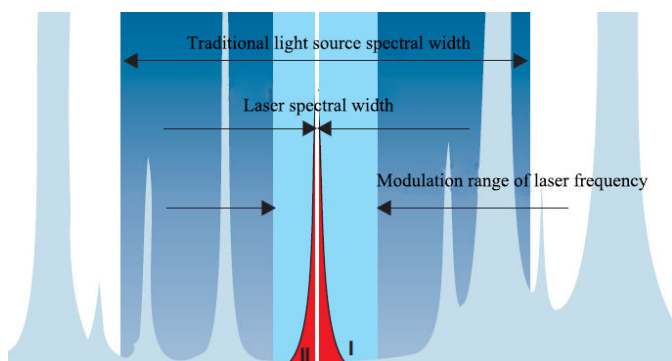
## State-of-the-art Performance



### Measuring Principle

TDLAS (Tunable Diode Laser Absorption Spectroscopy) mainly uses the character that Tunable laser's narrow band and wavelength change with the current.

So by precisely modulating the current of tunable laser, it can scan a certain absorption peak of detected gas (no absorption of background gas).



And after obtaining the second harmonics absorbed by detected gas, it finally works out the concentration of detected gas by using this second harmonics and line-width.

The TDLAS technology has been developed into a kind of high sensitivity, high resolution, fast response time and high selectivity of gas detection technology, widely used in industrial process monitoring control.

By using a tunable semiconductor laser, AtLAS-900 scans the specific absorption line of the measured gas (no background gas) to get the second harmonic of the gas.

Through processing and analyzing the second harmonic and the broadening information of the gas, the concentration of the gas is obtained.



### Features

#### High Performance

- Adopting wavelength-modulation-spectroscopy allows better signal/noise ratio and anti-interference capability of dust and background gas
- Single line spectrum technology, free from interference of background gas
- Extremely high stability and repeatability
- Almost instantaneous response time

#### Interface

- I/O interface, self-diagnosis and alarms
- Local OLED display with magnetic keys, operated by magnetic pen without opening the housing



#### Easy to Use

- Easy optical path adjusting, XY direction non-coupling adjusting
- Modular design makes field maintenance operations very easy
- Simple to clean in case dirty deposits on the optical parts



#### Low Costs of Ownership

- In situ measurement
- No sampling system required
- Small drift, long maintenance period

# Measurable Gas Table

## TDLAS Analyser AtLAS-900

### Single Gas Analysers

Gas	Detection Limit	Min. & Max. Range
O <sub>2</sub>	0.01% O <sub>2</sub>	0-1%...0-25% vol.
CO	1 ppm	0-100 ppm...0-100% vol.
CO <sub>2</sub>	40 ppm	0-100 ppm...0-100% vol.
H <sub>2</sub> O	100 ppm	0-1%...0-100% vol.
H <sub>2</sub> S	5 ppm	0-1000 ppm...0-100% vol.
HCl	0.1 ppm	0-100 ppm...0-50% vol.
HCN	0.2 ppm	0-200 ppm...0-50% vol.
HF	0.05 ppm	0-10 ppm...0-50% vol.
NH <sub>3</sub>	0.5 ppm	0-10 ppm...0-100% vol.
CH <sub>4</sub>	10 ppm	0-200 ppm...0-100% vol.
C <sub>2</sub> H <sub>2</sub>	0.5 ppm	0-50 ppm...0-100% vol.
C <sub>2</sub> H <sub>4</sub>	1.0 ppm	0-100 ppm...0-100% vol.

### Multi Gas Analysers

Gas	Detection Limit	Min. & Max. Range
CO + CO <sub>2</sub>	20 ppm	0-5000 ppm...0-100% vol.
NH <sub>3</sub> + H <sub>2</sub> O	0.5 ppm (NH <sub>3</sub> ) 0.05% (H <sub>2</sub> O)	0-20 ppm (NH <sub>3</sub> ) 0-1% (H <sub>2</sub> O)
HCl + H <sub>2</sub> O	0.1 ppm (HCl) 0.1% (H <sub>2</sub> O)	0-100 ppm (HCl) 0-1% (H <sub>2</sub> O)
HF + H <sub>2</sub> O	0.05 ppm (HF) 0.01% (H <sub>2</sub> O)	0-20 ppm (HF) 0-1% (H <sub>2</sub> O)

Test conditions: 1 meter optical path, 1 bar gas pressure, 27°C

Ranges expressed in mg/m<sup>3</sup> are available

The effective detection limit depends on optical path, temperature, pressure and range

# Contacts



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